THE Cane Growers' QUARTERLY BULLETIN

VOL. XX., No. 2 I OCTOBER, 1956

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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

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The

Cane Growers' Quarterly Bulletin

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The Loss of Activity of 2,4-D as a Pre-emergence Weedicide

By A. G. Barrie

It is well known that 2,4-D sprayed on the soil does not last for ever. In fact it is quite the opposite in many cases and its effect is lost all too soon and weeds begin to grow. There are a number of factors operating which bring about the loss of activity of the 2,4-D. Perhaps in some ways it is fortunate that such factors are in operation, because if they were not, the 2,4-D would, with continued application, accumulate in the soil to such a concentration that no plant would grow.

The first thing that happens to the 2,4-D when it is sprayed on to the soil is that some of it is adsorbed, that is to say it forms a fine film upon the surface of the particles. This adsorbed 2,4-D, if present in sufficient quantity, is capable of preventing the germination of seeds. As soils differ greatly in their clay and organic matter content they also differ in their ability to adsorb 2,4-D. The 2,4-D that is fixed to the soil in this way is not carried down to lower depths by rainfall.

The remainder of the 2,4-D can be washed or leached out of the soil. Experiments which prove this have been carried out on three soils of North Queensland, namely, red volcanic, red-brown schist and alluvial soils. A column of soil was placed in a pliofilm (a plastic material) tube and 2,4-D was sprayed on to the top of the soil. Water equivalent to two inches of rainfall was then applied to the surface. The depth to which it washed the 2,4-D downward was determined by cutting the column of soil into inch wide sections and testing these sections for their 2,4-D content. The tests showed that after the equivalent of two inches of rainfall had passed through the soil the 2,4-D was fairly evenly distributed over the top three inches, with small amounts going down as far as the fifth and sixth inch layers in the red-brown schist and red volcanic soils respectively. These soils were all of a high clay content and probably with light sandy soils the 2,4-D would move down to lower depths.

The removal of 2,4-D from the surface layers can have two consequences: firstly, the concentration is lowered in the upper soil levels and weed growth is more likely and, secondly, the 2,4-D in the lower levels may conceivably have a detrimental effect on the roots of the cane plant. Very heavy falls of rain after harvesting and planting are generally not experienced, so the roots of the cane are not

affected, particularly if the recommended amounts of 2,4-D are not exceeded. However, if excessive amounts of 2,4-D had been applied just prior to the onset of the wet season damage to the roots is a possibility.

There is a great deal of evidence to show that soil microorganisms can cause the decomposition and removal of 2,4-D from the soil. This effect has been noticed to be much more rapid in heavily manured soils. These soils would have a much larger population of soil organisms than one containing little or no humus. Further evidence of the action of microorganisms is obtained if the soil is sterilized to kill the microorganisms. Soil treated in this way does not inactivate the 2,4-D with the same rapidity.

The process of decomposition by microorganisms is slow to start with and then becomes very rapid. The population of 2,4-D-decomposing organisms is evidently small at first but with additions of 2,4-D they build up in numbers. A further application of 2,4-D to soil which has a large population of 2,4-D-decomposing organisms would then be very rapidly inactivated.

During these studies a sandy loam soil containing a large amount of organic matter was sprayed with 2,4-D and incubated for a period of six weeks. On extracting the 2,4-D with water it was found that it had practically all disappeared. Since 2,4-D had not been applied to the soil before the experiment commenced it was evident that the organisms are able to exist on food material other than 2,4-D, but when 2,4-D is available they increase very rapidly. How long the big populations of 2,4-D-decomposing organisms remain in the soil without the addition of 2,4-D is unknown. However, many farmers who have now been using 2,4-D annually for a number of years still obtain good control of weeds, so it appears that the populations do decrease to a low level after one year. There may be some soil types which are capable of harbouring large populations of these organisms for a long period and this may explain some of the failures of 2,4-D to control weeds.

Fig. 25—Cutting the soil cylinder into sections before testing for 2,4-D content.

Some Facts on Fertilizer

By C. G. STORY

Canegrowers are fertilizer conscious and, following the receipt of fertilizer recommendations from the Bureau, often enquire about the contents of the various fertilizer mixtures sold by respective firms. It is to the canegrower's advantage to make himself acquainted thoroughly with the constituents of each fertilizer advertised as useful for his purpose before making a purchase. The following covers many enquiries received during 1955 regarding fertilizer mixtures.

REGISTRATION

"The Agricultural Standards Act of 1952" controls the registration and sale of fertilizer. The definition of a fertilizer under the above mentioned Act is as follows:—

"Fertilizer—Any material used or intended as a fertilizer or manure, or for supplying nutrient for the use of plants, or for remedying or assisting to remedy any deficiency or excess in the soil. The term does not include lime, nor farmyard, sheep, poultry, or stable manure, nor humus, peat, seaweed, town refuse, crude offal, nightsoil, or trade waste unless—(1) mixed with a fertilizer; or (2) containing or claimed to contain active constituents as prescribed; or (3) claimed to possess fertilizing value."

It is necessary for all fertilizer to be registered under this Act before it may be sold. It must then comply with certain conditions and specifications. For instance, a printed label must be attached to every package of the fertilizer setting out the percentage of nitrogen, phosphoric acid and potash contained therein and also the degree of fineness. These details must be printed on the label legibly and indelibly by a printing press, together with the name of the preparation. The net weight or measure contained in the package to which it is affixed must also be stated.

This label and the invoice warranty which must accompany every sale over the value of ten shillings are the purchaser's guarantee as to its quality.

GUARANTEED MINIMUM ANALYSIS

Canegrowers will have noted that some fertilizer labels show two sets of figures, one under a heading "Guaranteed Minimum Analysis" and the other "Analysis calculated from the ingredients used in this mixture," *e.g.*:—

Guaranteed Minimum Analysis	Analysis calculated from the ingredients used in this mixture
3.5 per cent. Nitrogen as Ammonium Sulphate ..	3.67 per cent.
1.0 per cent. Nitrogen as Blood and Bone	1.07 ,,
3.25 per cent. Phosphoric Acid as Bone	3.43 ,,
4.5 per cent. Phos. Acid (Water sol.) as Super	4.8 ,,
0.25 per cent. Phos. Acid (Insol.) as Super	0.34 ,,
22.5 per cent. Potash as Muriate	22.93 ,,

The Act requires a Minimum Guarantee to be stated on the label; therefore, to obtain this and to be sure that the mixture does comply with the guarantee, manufacturers use an over-run, that is, they use an excess of each ingredient to ensure that the analysis guarantee is maintained. Consequently the actual amounts present are usually a little higher than those guaranteed.

INGREDIENTS CONTAINED IN MIXTURES

The more common ingredients used in compounding mixed fertilizers, and their active constituents, are as follows:

Ingredient	Active Constituent	Percentage
sulphate of ammonia	nitrogen	20.6
superphosphate	phosphoric acid	20.5 (soluble in water)
		1.5 (insoluble in water)
muriate of potash	potash	60.0
Meatworks fertilizer	nitrogen	5.0
	phosphoric acid	18.0

SOME USEFUL CALCULATIONS

The following details show how to calculate the amount of any ingredient, *e.g.*, sulphate of ammonia, which is contained in a ton of some particular mixture. This may be done by using the formula:—

$$\frac{2240 \times \text{per cent. of active constituent on label}}{\text{per cent. of active constituent in ingredient concerned}}$$

Therefore if a grower wishes to know how much sulphate of ammonia is contained in one ton of a mixture showing 5 per cent. nitrogen on the label, he calculates as follows:—

per cent. of active constituent shown on label = 5

per cent. of active constituent in ingredient concerned = 20.6

$$\frac{2240 \times 5}{20.6}$$

= 544 lb. (to the nearest lb.)

i.e., there is 544 lb. of sulphate of ammonia in one ton of a fertilizer mixture which shows 5.0 per cent. nitrogen on the label.

The amounts of other ingredients could be found by using the formula in a similar manner, and it would be found that (to nearest lb.):—

One ton of mixture showing 5 per cent. water soluble phosphoric acid contains 546 lb. superphosphate.

One ton of mixture showing 10 per cent. water soluble phosphoric acid contains 1092 lb. superphosphate.

One ton of mixture showing 15 per cent. water soluble phosphoric acid contains 1639 lb. superphosphate.

One ton of mixture showing 5 per cent. potash contains 187 lb. muriate of potash.

One ton of mixture showing 10 per cent. potash contains 373 lb. muriate of potash.

One ton of mixture showing 15 per cent. potash contains 560 lb. muriate of potash.

Furthermore there are 14 bags of mixed fertilizer to 1 ton, so, dividing the above figures by 14 will give the amount per 160 lb. bag.

Typical Fertilizer Questions

The following is a type of problem on which growers request information when purchasing their ratooning fertilizer:—

The Bureau fertilizer recommendation for a particular soil sample is 4 cwt. of Sugar Bureau No. 2 Ratooning Mixture plus a top-dressing of 1½ bags of sulphate of ammonia per acre.

The grower wishes to know:—

(*a*) How much of each ingredient is he applying per acre?

(*b*) Because of a shortage of sulphate of ammonia, or some other reason, he finds it necessary to use for top dressing a fertilizer mixture containing 15 per cent. nitrogen as sulphate of ammonia. How much of this will he need to apply to equal the 240 lb. of sulphate of ammonia in the recommendation?

(*c*) What is the difference in cost for top dressing?

Answers:

(*a*) By using the formula again with the details given on the label he will find that 4 cwt. of Sugar Bureau No. 2 Ratooning Mixture contains approximately:—

96 lb. of sulphate of ammonia
254½ lb. of superphosphate
93½ lb. of muriate of potash.

The top dressing of 240 lb. (1½ bags) of sulphate of ammonia makes the total amount of sulphate applied per acre:—

96 plus 240 = 336 lb. = 3 cwt.

(*b*) The mixture with 15 per cent. nitrogen will contain

$$\frac{2240 \times 15}{20.6 \times 14}$$

= 117 lb. sulphate of ammonia per bag (160 lb. bag).

Therefore 2 bags of mixture will contain 234 lb., which is about equal to 240 lb. or 1½ bags of straight sulphate of ammonia.

(*c*) Cost per acre of top dressing with 1½ bags of sulphate of ammonia at £40/7/6 per ton (14 bags)

= £4/6/8.

Cost per acre of top dressing with 2 bags of mixture containing 15 per cent. nitrogen at £39/12/6 per ton (14 bags)

= £5/13/2.

Difference in favour of straight sulphate of ammonia

= £1/6/6 per acre.

For large areas this amounts to a considerable sum.

A Note on Warfarin

By W. A. McDOUGALL

From 1944 to 1948 at the Central Experiment Station, Mackay, many rat poisons were screened against native rats attacking sugar cane, and the relative merits of some have been discussed at length elsewhere. Those of little value, including R42 or Compound 42, were discarded without published comment. During the past few years that same material under the name of warfarin has been given a great deal of trade publicity, and consequently has been tested, particularly against the brown rat and the house rat, under a wide range of conditions. Where health risks prohibit the use of the better rat poisons warfarin has achieved some success. As it kills rats only after appreciable intakes on at least three successive nights, feeding stations must be used.

Our native rats are difficult to poison, chiefly because man-made intrusions into their surroundings seldom raise their curiosity to any great extent or interfere with their wanderings. In practice this means that the pests must be dealt with on a grid system with a 10 yard interval; that the broadcasting of poisoned material is not worthwhile; that most rats in moving populations make only a cursory inspection of poisoned food either as baits or at feeding stations; and that the use of feeding stations does not improve pest kills but merely serves as a means of presenting larger quantities of expensive food material to native animals other than rats.

Satisfactory commercial poisoning in canefields can be obtained only in settled rat populations, when some 80 per cent. of the pests are killed by the intake during the first night after baiting. Obviously warfarin, which is marketed under a number of trade names, is not a suitable poison to use when attempting this objective.

Margarodes on Sugar Cane Roots*

By B. E. HITCHCOCK

Introduction

The members of the genus *Margarodes* are commonly called "earth pearls" and belong to the mealy-bug group. The species discussed here spend their entire life-cycle in the ground on the roots of cane and sometimes on the roots of associated weeds and grasses. The purpose of this paper is to bring this group to the attention of supervisors with the object of augmenting our knowledge of its activities.

Life History

The most common stage of these species is the "earth pearl" or larval form which may be found in large numbers attached to cane roots by a long thread-like feeding tube, or loose in the soil, in which latter case the feeding tube is frequently absent. The pearl may be from $\frac{1}{16}$in. to $\frac{1}{8}$in. in diameter and it usually is of a cream pearly lustre, but the colour may vary from white through to greyish brown in different species. In one species at least the pearl has been observed to change to a definite pink shortly before the emergence of the adult. Transformation to the adult stage usually commences about October, and in infested areas this stage is normally plentiful during November and December.

The adult female which emerges from the pearl is similar to a mealy-bug in shape and size but is a deep pink colour and lacks the covering of powdery wax. It also lacks a feeding tube, but antennae and stout digging legs are well developed. These females excavate small cavities in the soil which they fill with a fluffy mass of wax which they secrete and in which the eggs are laid.

The eggs are elongate with rounded ends and are about $\frac{1}{32}$in. in length. From them emerge the small white six-legged larvae which are $\frac{1}{16}$in. in length and equipped with clubbed antennae and a long feeding tube. As these larvae grow by sucking sap from the roots, they swell to the globular shape of the earth pearl and at the same time secrete a test, or mica-like covering, which completely envelops them. The antennae and legs disappear about this time, although a definite moult has not so far been observed.† As feeding continues the pearl increases in size until development is complete, and after an appropriate resting pause the adult female emerges.

Effect of Feeding on Cane Growth

Stunting of stools apparently due to feeding by *Margarodes* has been observed at Bundaberg for some years and generally occurs in patches.

At Mackay an infestation was discovered in October, 1955, in young first ratoon Q.50. Here considerable death of stools had occurred, some having failed to ratoon while others had died when 12in.-18in. high. Other additional factors, however, may have been involved in this instance. Living infested stools showed stunting with yellowing of the lower leaves.

At Tully an infestation was observed in a block of young first ratoon Q.44 in January this year. In this block patches occurred where either the stools had failed to ratoon or were extremely stunted with scalding of the lower leaves. A few living and numbers of empty tests were found under the stunted stools while adjacent better grown stools showed heavy populations of living pearls on the roots. Therefore the position here regarding the exact cause of the damage is not clear.

At Babinda a further infestation was noted in February this year in well

* Reprinted from the Proceedings of the Conference of Cane Pest and Disease Control Boards.

† The moult has recently (March, 1956) been observed.—ED.

grown first ratoon Clark's Seedling. Here, in spite of a large population being present, no obvious damage to cane growth was visible.

Microscopic examinations of pearls from these localities show sufficient differences between them to suggest that different species are present at Babinda, Mackay and Tully, while at least two species occur in canefields in the Bundaberg district.

The adult female has so far only been obtained from Bundaberg and Mackay and until this stage has been obtained from the other localities no definite conclusions can be reached on this aspect.

Conclusions

Species of *Margarodes* infest sugar cane in several districts in Queensland and sometimes cause loss of yield. Damage by heavy populations consists of stunting of the stools with attendant yellowing of the leaves.

Field and laboratory observations indicate that a number of species may be involved but definite conclusions on this point require further studies. In the meantime it is suggested that supervisors keep a look out for this group on any occasion when soil is being disturbed, particularly when investigating poor patches of cane. Occurrences of *Margarodes* should be reported to the Bureau and specimens forwarded so that our knowledge of their distribution may be enlarged.

Distribution of Q.57 and Q.59

During the 1956 planting season in the Innisfail-Tully area a general distribution was made of the varieties Q.57 and Q.59. Both varieties have performed satisfactorily in district-wide plantings, and it was considered that both had a place in the varietal complex of the district. The resistance of both canes to lodging and breakage during the March cyclone attracted many growers who would not otherwise have ventured beyond the existing approved varieties. The illustration shows farmers on a Mourilyan property cutting and loading both Q.57 and Q.59 for planting purposes.

Fig. 26—Growers loading Q.57 and Q.59 cane plants during the distribution in the Mourilyan area.

Varietal Trials — 1954 and 1955 Seasons

By G. C. BIESKE

NORTHERN SUGAR EXPERIMENT STATION, Gordonvale, Block A.3.

Soil type: Brown to grey clay loam. **Nature of crop:** Plant.
Age of crop: 12½ months. **Harvested:** July, 1955.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Pindar	39.05	13.86	5.41
K.690	36.82	13.36	4.93
K.675	34.67	13.32	4.60
K.728	30.04	14.68	4.41
K.646	31.94	13.05	4.17

DISCUSSION

Good germination occurred in all varieties in this trial and early growth was very satisfactory. By June, 1955, K.675 and K.690 were arrowing freely, K.728 less so, while K.646 was flagging. K.675 showed a tendency to lodge and would appear to be an undesirable cane for good soils. The remainder of the varieties were erect at harvest time.

Pindar has produced the most cane and sugar per acre and significantly exceeded K.675, K.728 and K.646 at the 1 per cent. level of significance, and K.690 at the 5 per cent. level of significance. Maturity testing indicated that K.728 had good early sugar and at harvest had the highest c.c.s. figure.

C. MATTHEWS AND SON, Septimus.

Soil type: Alluvial sandy clay loam. **Nature of crop:** Plant.
Age of crop: 16 months. **Harvested:** November, 1955.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Trojan	66.47	16.50	10.94
I.102	61.13	16.05	9.82
J.P.164	57.38	16.94	9.72
I.106	52.22	17.44	9.11
I.P.180	53.91	16.71	9.01
H.130	51.10	17.02	8.71
I.P.181	50.53	17.27	8.71
J.P.178	47.72	17.10	8.18

DISCUSSION.

Soil moisture was fairly good at planting, but conditions remained dry for the next three months. Germination was slow with J.P.164, I.102, I.106 and Trojan giving the fastest and best strikes. H.130 and I.P.180 were very slow and produced gappy stands. An abnormal wet spell commenced in October, 1954, and continued through to May, 1955, and consequently the trial made rapid growth. J.P.164 lodged early and by harvest time the heavy wet conditions had caused lodging to various degrees in all varieties except Trojan and I.102.

Although Trojan had the second lowest c.c.s. figure, this variety was outstanding in producing the most cane and sugar per acre. I.102 and J.P.164 performed reasonably well, but the latter variety's habit of lodging is a serious handicap. The remainder of the varieties had good c.c.s. figures, but this was offset by the lowered cane tonnage.

W. J. RAMM, Maroochy River, Moreton.

Soil type: Alluvial silty clay loam.
Nature of crop: Plant.
Age of crop: 13 months.
Harvested: October, 1955.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Q.62	29.50	15.64	4.61
I.70	26.69	15.30	4.08
Pindar	25.06	15.42	3.86
Q.61	25.00	13.86	3.46
I.53	22.88	14.24	3.26
H.45	22.25	14.19	3.16

DISCUSSION.

Germinations over 90 per cent. were recorded for each variety with Q.61 and Q.62 leading in early vigour. An inspection in December, 1954, revealed the presence of chlorotic streak symptoms in all varieties. H.45 and I.53 arrowed early and at harvest time Q.61 and Q.62 were arrowing very sparsely.

The three varieties Q.62, I.70 and Pindar had the best performance, Q.62 possessing a slightly higher tonnage and c.c.s. Pindar showed the best early sugar as indicated by maturity testing at 10 months. I.53 and H.45 did not impress at any stage and produced approximately 1.5 tons of sugar less than the leader, Q.62.

GIBSON AND HOWES LTD., Bingera.

Soil type: Red loam.
Nature of crop: Plant.
Age of crop: 9½ months.
Harvested: July, 1954.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
I.53	39.94	11.60	4.64
I.17	37.19	12.35	4.60
I.9	38.20	12.02	4.57
I.22	36.19	12.44	4.49
I.18	39.81	11.05	4.41
I.70	35.12	12.06	4.24
I.27	36.62	11.44	4.18
Q.47	15.19	11.82	1.78

DISCUSSION.

The harvest results of this plant crop have been influenced by several factors and it is unfortunate that the yield of the standard variety, Q.47, is well below normal. The planting supplies of Q.47 were hot-water treated and a very slow and poor germination resulted in this variety. The "I" series seedlings germinated well and made good growth. I.17, I.18, and I.22 showed a tendency to be brittle at the nodes while semi-erect growth was noted in I.17 and I.22. In regard to growth habit and vigour, I.53, I.27, I.9 and I.70 were the most impressive.

This trial was accidentally burnt at 9½ months, but even at this early age the "I" series seedlings produced reasonably good cane and sugar tonnages, no one seedling being significantly superior. Q.47 was significantly outyielded by the other varieties in both cane and sugar per acre. I.27, recently placed on the approved list of varieties and assigned the "Q" number Q.62, was not able to demonstrate its capacity to produce sugar since this variety matures about mid-season. However, it ratoons vigorously and evenly, and should show up well in the ratoon crop.

GIBSON AND HOWES LTD., Bingera.

Soil type: Red loam. **Nature of crop:** Plant.

Age of crop: 20 months. **Harvested:** July, 1954.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Q.47	70.75	12.00	8.49
H.6	67.36	12.45	8.39
H.18	69.62	11.67	8.12
H.42	67.56	11.91	8.07
H.45	68.12	11.67	8.00
Castor	52.75	12.27	6.51

DISCUSSION.

This standover varietal trial was planted in November, 1952, and all the varieties except Castor progressed satisfactorily. The occurrence of two diseases in Castor, namely, Pokkah Boeng and Rind disease, considerably reduced the yield of this variety.

At the time of harvest Castor was the only erect variety, the other varieties lodging badly with perhaps Q.47 the least affected. Q.47 produced the most cane and sugar per acre but was not significantly superior to the "H" series seedlings. All varieties significantly outyielded Castor in cane per acre. H.6 has now been elevated to the status of a "Q" cane and allotted the number Q.61.

E. C. THIELE, Barolin Road, Bundaberg.

Soil type: Forest red sandy clay. **Nature of crop:** First Ratoon.

Age of crop: 12 months. **Harvested:** December, 1954.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
I.53	34.35	15.02	32.52	15.02	66.87	10.04
I.16	32.02	14.18	27.61	15.90	59.63	8.93
I.18	29.32	14.39	32.78	15.40	62.10	9.27
Castor ..	29.18	15.87	21.43	16.03	50.61	8.06
I.22	28.74	16.42	27.23	16.50	55.97	9.22
Q.47	28.11	15.01	31.12	15.60	59.23	9.08
I.28	23.70	15.57	19.26	14.90	42.96	6.56
I.69	23.64	12.44	22.13	14.20	45.77	6.08

DISCUSSION.

In ratooning ability I.53 was outstanding, followed by I.18, I.22, Castor, I.16 and Q.47 in that order. I.28 and I.69 ratooned very badly and the poor stands which developed are reflected in the final yields.

At harvest there was little to choose between I.18, I.53 and Q.47 in both cane and sugar per acre, while I.16 and I.22 performed reasonably well. In the aggregate of the two crops, the variety with most cane and sugar per acre was I.53, which was impressive in regard to vigour, stooling and ratooning. This variety was followed closely by I.18, I.22 and Q.47, each of which produced comparable amounts of sugar. I.22 had the highest early sugar and the highest c.c.s. figures in each crop.

A. G. E. HANSEN, Duncraggan Road, Bundaberg.

Soil type: Red volcanic loam.
Age of crop: 10 months.
Nature of crop: Second Ratoon.
Harvested: August, 1954.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Second ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Per cent.	Tons	Tons
I.70 ..	36.26	14.01	39.13	14.69	44.50	15.3	119.89	17.64
I.53 ..	24.07	13.53	42.17	14.28	40.98	14.6	117.22	16.61
I.27 (Q.62)	31.58	13.65	44.51	15.14	44.58	14.6	120.67	17.56
I.22 ..	31.09	14.41	36.08	14.61	37.00	15.6	104.17	15.52
I.8	30.78	13.74	31.86	14.85	34.90	13.8	97.54	13.78
I.9	28.71	13.41	43.97	14.84	41.08	15.3	113.76	16.64
Q.47 ..	26.90	14.20	35.30	15.07	38.95	14.9	101.55	14.94
I.16 ..	26.54	14.51	37.88	15.23	42.70	15.0	107.12	16.02
I.17 ..	26.30	14.52	29.13	14.76	28.65	15.6	84.08	12.59
I.28 ..	24.48	14.99	33.90	15.34	33.35	15.3	91.74	13.97

DISCUSSION.

This trial was ratooned again in October, 1953, and ratooning was good in all varieties except I.8, I.28 and Q.47, which were slow and backward. I.70 made slow early growth but then grew vigorously and together with I.53 appeared the most impressive variety in the trial. In June, 1954, I.27, I.28, Q.47 and I.16 were arrowing and inspections carried out at this time indicated

the presence of r.s.d. in all varieties. At harvest time, I.9, I.70 and Q.47 were the only varieties not sprawled. I.27, I.70, I.16, I.9 and I.53 produced more sugar per acre than the standard variety, Q.47, although not significantly so. In the aggregate of the three crops, all but I.8, I.17 and I.28 outyielded Q.47 in both cane and sugar per acre, I.70 and I.27 performing particularly well. However, the presence of r.s.d. would cast some doubts on the overall results of this trial.

I.27 has consistently performed very well in other parts of the Bundaberg district and is now designated Q.62.

C. B. COURTICE, Hummock Road, Bundaberg.

Soil type: Red volcanic loam.
Age of crop: 14 months.
Nature of crop: Plant.
Harvested: November, 1955.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
I.70	37.63	15.54	5.86
Q.50	35.72	15.46	5.53
Q.61	32.18	15.74	5.06
Q.62	32.18	15.11	4.87
C.P.29/116	33.55	14.38	4.82
H.25	32.50	14.72	4.78
I.53	32.50	14.40	4.68
H.45	29.22	15.32	4.48

DISCUSSION.

With the exception of Q.62, an excellent germination occurred in this trial and Q.61, C.P.29/116 and Q.50 exhibited the most vigour in early growth. An unfortunate germination of 35 per cent. in the Q.62 plots necessitated extensive supplying of this variety. Throughout the crop cycle all varieties maintained good growth and in July, 1955, arrowing was profuse in H.45, C.P.29/116, H.25, and I.53, scattered in Q.61, Q.62 and Q.50, and absent in I.70. At harvest time red rot was present to a slight extent in Q.50.

With the exception of Q.50 and C.P.29/116, I.70 has significantly outyielded the other varieties in cane per acre, while the sugar produced by I.70 significantly exceeded all but Q.50 and Q.61. Q.61 and Q.62 showed the highest early sugar and in view of the early handicap of Q.62 this variety should do better in the ratoon crop.

W. J. CLAYTON & CO., North Isis.

Soil type: Red volcanic loam.
Age of crop: 12 months.
Nature of crop: Plant.
Harvested: November, 1955.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
H.25	37.77	15.90	5.99
Castor	35.58	16.04	5.71
C.P.29/116	37.18	15.05	5.58
H.19	34.06	15.75	5.37
Q.61	32.14	15.45	4.95
H.20	31.68	15.48	4.90
H.45	29.89	15.42	4.61

DISCUSSION.

There was a good strike in all varieties and in the early stages of growth H.25, Q.61 and C.P.29/116 had established a slight lead which was maintained by H.25 and C.P.29/116 through to harvest. By June, 1955, H.45 had arrowed while C.P.29/116 was flagging. At harvest time in November, H.25, Castor and Q.61 were the only varieties not arrowing.

H.25 has produced the highest cane and sugar yields and these were significantly greater than the yields for H.19, Q.61, H.20 and H.45.

QUNABA PLANTATION, Bundaberg.

Soil type: Red volcanic loam.
Age of crop: 13 months.
Nature of crop: First Ratoon.
Harvested: October, 1954.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
J.34	39.51	11.11	56.90	14.30	96.41	12.53
J.28	38.63	11.49	48.78	15.00	87.41	11.76
J.33	38.38	11.96	52.00	15.30	90.38	12.55
Q.50	37.56	11.71	41.35	13.90	78.91	10.15
J.38	34.66	10.73	54.70	14.00	89.36	11.38
J.70	32.96	10.41	46.65	16.28	79.61	11.03
J.68	32.71	11.62	38.95	15.82	71.66	9.96
J.58	29.56	9.61	44.48	14.40	74.04	9.24
J.66	29.56	12.21	38.68	14.90	68.24	9.37
J.64	27.79	15.55	31.65	15.40	59.44	9.20
J.32	27.35	14.77	33.05	15.40	60.40	9.13

DISCUSSION.

With the exception of J.32 and J.64 all the seedlings ratooned well and compared favourably with the standard Q.50. J.32 and J.64 ratooned badly and uneven stands of cane resulted. J.28 appeared to be the most vigorous variety in the early stages and was closely followed by J.34, J.33, J.38 and Q.50. By June, 1954, J.68, J.32 and J.33 had arrowed and an inspection at this period also revealed the presence of r.s.d. in all varieties. At harvest the heaviest yielders had lodged or sprawled following cyclonic weather, and it was also noted that Q.50 was suffering from pithiness in the stem, this no doubt accounting for the low sugar content in this variety.

J.34 was the leader in both cane and sugar per acre, although it was not significantly superior to J.38, J.33, J.28 and J.70. On the results of the plant and first ratoon crops J.33 and J.34 produced the most sugar, the former variety at the higher c.c.s. The standard variety, Q.50, was also exceeded by J.28, J.38, and J.70 in sugar per acre, but the presence of r.s.d. and large plot variations which occurred make the results of the trial inconclusive.

B. ANDERSON, Alloway, Bundaberg.

Soil type: Red forest sandy clay loam.
Age of crop: 11 months.
Nature of crop: First Ratoon.
Harvested: September, 1954.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
I.70	53.44	14.09	50.88	14.5	104.32	14.91
C.P.29/116 ..	46.90	11.79	44.62	13.9	91.52	11.73
I.9	46.28	13.14	47.28	12.9	93.56	12.18
I.27	45.12	14.76	47.68	15.3	92.80	13.95
I.8	43.26	13.31	40.82	12.9	84.08	11.03
I.17	38.58	14.90	42.10	15.4	80.68	12.23

DISCUSSION.

A considerable variation in plot yields occurred in the first ratoon crop, probably due to the presence of r.s.d. in all varieties. It is not surprising therefore that at harvest the differences between varieties could not be regarded as being significant. In the early ratoons, I.70 concentrated on the production of a good stool and in comparison with I.27, I.17, I.9 and C.P. 29/116, appeared to lack vigour. By May, 1954, however, I.70 looked most impressive.

In the aggregate of the two crops I.70 performed creditably, producing 3.2 tons of sugar more than C.P.29/116 and in both crops had the higher c.c.s. I.27, I.9 and I.17 also exceeded C.P. 29/116 and of these, I.27 showed to advantage in both cane tonnage and c.c.s.

I. P. WEBBER, Lover's Walk, Bundaberg.

Soil type: Red forest sandy clay loam. **Nature of crop:** Second Ratoon.
Age of crop: 11 months. **Harvested:** October, 1954.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Second ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Per cent.	Tons	Tons
H.4 ..	48.70	14.21	37.98	13.35	42.60	14.60	129.28	18.21
H.6 ..	43.54	16.79	37.58	14.24	40.05	14.50	121.17	18.47
H.45 ..	41.44	16.89	39.27	15.41	41.78	14.20	122.49	18.98
H.42 ..	41.24	15.45	35.00	14.43	38.72	15.40	114.96	17.38
H.20 ..	40.29	16.41	38.12	15.32	40.00	15.00	118.41	18.45
Q.47 ..	38.93	15.57	30.59	14.38	35.55	14.20	105.07	15.51

DISCUSSION.

This trial ratooned well and early growth favoured H.45, H.6 and H.20. All varieties maintained good growth through to harvest when an inspection showed red rot infection in H.4.

Q.47 was significantly outyielded by all varieties in both cane and sugar per acre. Over the three crops H.4 has produced the greatest tonnage of cane, but in total sugar yield was overshadowed by H.45, H.6 and H.20. The susceptibility of H.4 to red rot is a decided disadvantage when considering this seedling's prospects as a commercial variety. H.45 produced the most overall sugar but was not significantly greater than H.6 and H.20.

Fig. 27—Caribao transport of cane in the Philippines.

Fig. 28—Cane planting in Bombay State, India. Furrows are first watered and the setts are pressed into the soil by hand on the wetted sides of the furrows.

Fig. 29—Looking over Innisfail Estate, Goondi Mill area.

Fig. 30—Mossman district from Julatten Road.

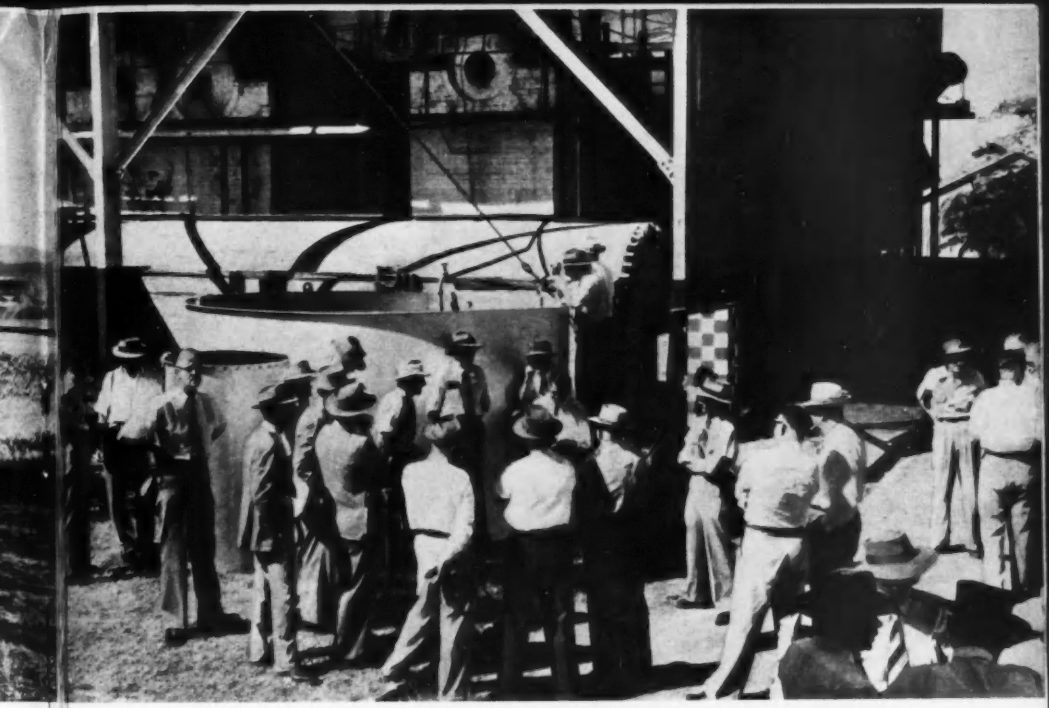

Fig. 31—During the Sugar Technologists Conference; a group of agricultural delegates at the Fairymead hot-water treatment tank.

Fig. 32—One of the large rotary hoes used in land preparation at Bingera Plantation.

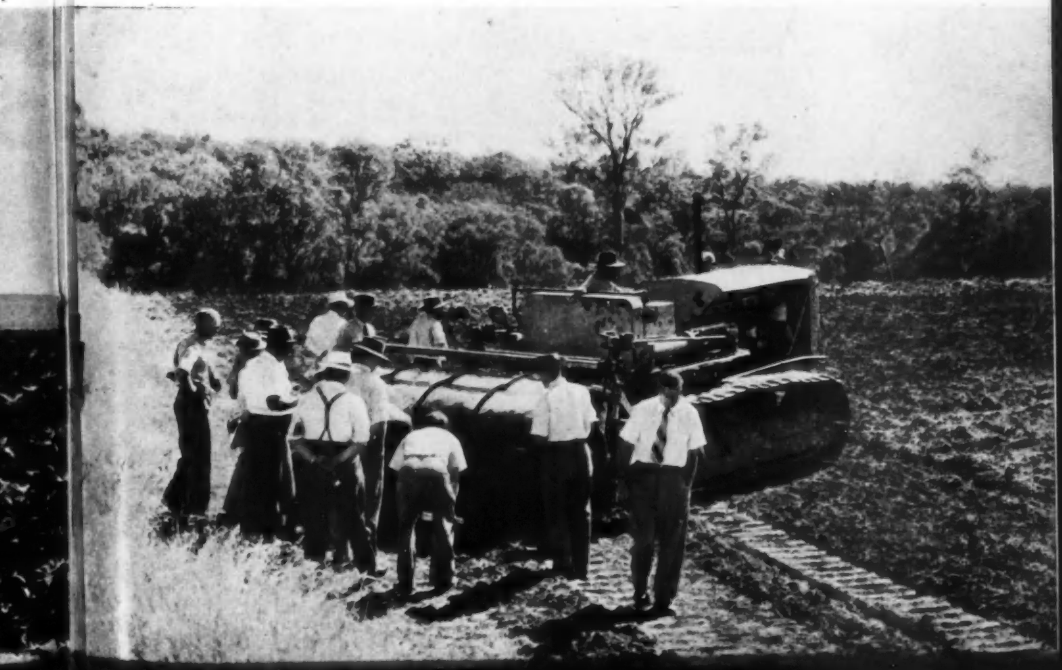

Fig. 33—Parties of cane growers being taken around the Experiment Station at the Bundaberg Field Day.

Fig. 34—Kamma district from Islay Hills.

Ratoon Stunting Disease Yield Trials

By D. R. L. STEINDL

The initial Queensland ratoon stunting disease yield trials, the first anywhere in the world, were described in the January, 1953, number of this Bulletin when both plant and ratoon results with Q.28 were listed. A further series of trials was set out during 1953 and results from the plant crop were published in January, 1955. Since then results of the ratoons of these trials and of the plant crop of an extensive series of trials planted in 1954 have come to hand.

Results to date of all trials are summarized in Table I.

It will be seen that generally the losses caused by the disease are not as severe as those suffered by Q.28; however, serious losses have resulted in several of the more important commercial varieties such as Trojan, Pindar, Q.47, N.Co.310, P.O.J.2878 and Vidar. Q.57, S.J.4 and S.J.16 have also suffered losses, while Badila, C.P.29/116, Comus and Q.50 were the least affected by the disease.

In the current series of trials Trojan suffered the greatest losses. In the plant crop losses in yield averaged 9.7 per cent. for fifteen trials, the highest being 25.2 per cent., while in the ratoons they averaged 25.5 per cent. for five trials, with the highest loss of 51.5 per cent. Losses in Pindar were as high as 22.9 per cent. in the plant crop, with an average of 9.3 per cent. for fourteen trials, and up to 26.65 per cent. in the ratoons, with an average of 19.15 per cent. for four trials.

Other substantial losses in individual trials were 18.5 per cent. in a plant crop of N.Co.310, 14.5 per cent. in plant P.O.J.2878, 17.7 per cent. in plant Q.47, 31.7 per cent. in plant S.J.4, and 21.9 per cent. in ratoon Vidar. There is little doubt that these losses would be considerably greater in a dry year.

It is pleasing to record that Q.50 continues to show a high degree of tolerance to the disease. In only one trial out of six did it show a significant loss in the plant crop, while in only one trial out of three was there a significant loss in ratoons.

A more complete picture of the losses caused by ratoon stunting disease will be obtained when the ratoon crops of the above plant trials are harvested. In many instances the full effect of the disease is not shown in these trials since the "healthy" cane used was not always 100 per cent. healthy, and, likewise, the diseased cane was not always 100 per cent. diseased. Another factor which placed some of the healthy plots at a disadvantage was that in order to get disease-free planting material the cane had to be hot-water treated, thus impairing germination and early growth of these plots.

C.c.s. determinations have been carried out on all trials, and although there has been some variation between healthy and diseased plots in individual trials, the general indications are that the disease has little or no effect on c.c.s. values.

Table II compares the average losses in yield of cane and sugar for each variety tested. It might be expected that the healthy cane would have a lower sugar content than the diseased because of the more vigorous growth of the former; however, with the possible exception of Pindar, and one or two other varieties, this does not appear to be the case. An average of all varieties would show approximately proportionate losses of cane and sugar as a result of the disease.

TABLE I

Summary of yields from various varieties in the ratoon stunting disease trials harvested to the end of 1955; Tons of cane per acre.

Variety	Crop	Yield		Loss	
		Healthy	Diseased	Tons	Percentage
Badila	Plant	58.23	57.02	1.21	2.08
"	"	33.45	32.65	0.80	2.39
"	"	37.32	32.17	5.25	14.07
"	"	25.83	25.58	0.25	0.97
"	"	36.33	37.58	−1.25	−3.44
"	Pl. Av.				3.21
"	Ratoon	30.20	27.18	3.02*	10.00
C.P.29/116	Plant	38.24	36.73	1.51	3.95
"	"	36.68	37.74	−1.06	−2.89
"	"	42.70	38.40	4.30	10.07
"	Pl. Av.				3.71
Comus	Plant	34.98	36.18	−1.20	−3.43
"	"	49.71	51.02	−1.31	−2.64
"	"	37.15	38.65	−1.50	−4.04
"	Pl. Av.				−3.37
"	Ratoon	23.06	23.17	−0.11	−0.48
N.Co.310	Plant	34.75	28.31	6.44†	18.53
"	"	28.75	25.33	3.42*	11.90
"	Pl. Av.				15.22
"	Ratoon	31.58	26.78	4.80†	15.20
P.O.J.2878	Plant	30.75	26.29	4.46*	14.50
"	"	36.01	31.70	4.31†	11.97
"	Pl. Av.				13.24
"	Ratoon	20.71	18.21	2.50	12.07
Pindar	Plant	25.11	21.86	3.25*	12.94
"	"	47.88	40.87	7.01†	14.64
"	"	49.98	49.30	0.68	1.36
"	"	41.67	35.83	5.84†	14.01
"	"	43.48	40.75	2.73	6.28
"	"	40.65	35.25	5.40†	13.28
"	"	37.80	34.90	2.90†	7.67
"	"	54.28	41.84	12.44†	22.92
"	"	49.50	48.15	1.35	2.73
"	"	34.86	32.24	2.62	7.52
"	"	38.10	37.80	0.30	0.79
"	"	31.43	26.61	4.82†	13.34
"	"	44.96	41.90	3.06†	6.81
"	"	33.56	31.50	2.06	6.14
"	Pl. Av.				9.32
"	Ratoon	30.63	25.64	4.99†	16.29
"	"	44.09	32.34	11.75†	26.65
"	"	27.43	25.07	2.36	8.60
"	"	38.01	28.48	9.53†	25.07
"	Ratoon Av.				19.15
Q.28	Plant	28.6	17.9	10.7 †	37.4
"	"	36.0	27.3	8.3 †	23.1
"	"	30.2	23.9	6.3 †	20.9
"	"	40.1	33.1	7.0 †	17.5
"	"	37.3	33.0	4.3 *	11.5
"	Pl. Av.				22.1
"	Ratoon	27.6	9.6	18.0 †	65.2
"	"	20.5	7.5	13.0 †	63.4
"	"	17.0	10.0	7.0 †	41.2
"	"	29.6	11.4	18.2 †	61.5
"	"	30.3	10.0	20.3 †	67.0
"	Ratoon Av.				59.7

TABLE I—*continued*

Variety	Crop	Yield		Loss	
		Healthy	Diseased	Tons	Percentage
Q.47	Plant	37.13	30.57	6.56†	17.67
,,	,,	34.63	35.43	−0.80	−2.31
,,	,,	35.14	31.22	3.92†	11.16
,,	Pl. Av.				8.84
Q.50	Plant	32.07	27.65	4.42*	13.78
,,	,,	36.97	37.02	−0.05	−0.14
,,	,,	36.78	35.03	1.75	4.76
,,	,,	46.10	46.38	−0.28	−0.16
,,	,,	32.47	30.25	2.22	6.84
,,	,,	25.97	25.68	0.29	1.12
,,	Pl. Av.				4.29
,,	Ratoon	32.91	30.25	2.66*	8.08
,,	,,	29.83	28.53	1.30	4.36
,,	,,	39.92	39.67	0.25	0.63
,,	Ratoon Av.				4.36
Q.56	Plant	30.66	31.00	−0.34	−1.11
Q.57	Plant	41.95	40.55	1.40	3.34
,,	,,	38.04	34.72	3.32*	8.73
,,	Pl. Av.				6.04
S.J.4	Plant	30.40	30.85	−0.45	−1.48
,,	,,	34.52	23.59	10.93†	31.66
,,	Pl. Av.				15.09
S.J.16	Plant	47.75	43.55	4·20	8.80
,,	,,	54.00	53.58	0.42	0.78
,,	,,	49.66	47.42	2.24	4.51
,,	,,	42.38	42.84	−0.46	−1.09
,,	Pl. Av.				3.80
,,	Ratoon	29.38	25.60	3.78	12.87
Trojan	Plant	37.04	29.58	7.46†	20.14
,,	,,	84.65	83.99	0.66	0.78
,,	,,	37.56	33.44	4.12†	10.97
,,	,,	45.83	34.27	11.56†	25.22
,,	,,	43.25	33.42	9.83†	22.73
,,	,,	31.59	26.72	4.87†	15.42
,,	,,	45.32	42.18	3.14	6.93
,,	,,	49.97	48.08	1.89	3.78
,,	,,	46.71	42.74	3.97*	8.50
,,	,,	25.08	25.26	−0.18	−0.72
,,	,,	38.57	37.13	1.44	3.73
,,	,,	30.95	31.20	−0.25	−0.81
,,	,,	24.23	19.53	4.70†	19.40
,,	,,	38.01	36.54	1.47	3.87
,,	,,	44.21	41.77	2.44*	5.52
,,	Pl. Av.				9.70
,,	Ratoon	20.38	17.96	2.42	11.87
,,	,,	43.07	38.77	4.30*	9.98
,,	,,	17.98	14.57	3.41†	18.97
,,	,,	28.58	13.86	14.72†	51.50
,,	,,	29.56	19.22	10.34†	34.98
,,	Ratoon Av.				25.46
Vidar	Plant	41.45	36.35	5.10†	12.30
,,	,,	39.17	35.00	4.17†	10.65
,,	,,	45.50	43.30	2.20	4.84
,,	Pl. Av.				9.26
,,	Ratoon	22.43	17.51	4.92†	21.93

* Differences significant at the five per cent. level.
† Differences significant at the one per cent. level.

TABLE II

Average percentage losses of cane and sugar in various varieties affected with ratoon stunting disease.

Variety	Crop	Number of trials	Average percentage loss	
			Cane	Sugar
Badila	Plant	5	3.21	4.97
,,	Ratoon	1	10.00	12.29
C.P.29/116	Plant	3	3.71	3.67
Comus	Plant	3	−3.37	−2.00
,,	Ratoon	1	−0.48	1.06
N.Co.310	Plant	2	15.22	13.68
,,	Ratoon	1	15.20	15.73
P.O.J.2878	Plant	2	13.24	14.88
,,	Ratoon	1	12.07	13.76
Pindar	Plant	14	9.32	7.26
,,	Ratoon	4	19.15	17.72
Q.47	Plant	3	8.84	5.84
Q.50	Plant	6	4.29	0.89
,,	Ratoon	3	4.36	4.80
Q.56	Plant	1	−1.11	−1.93
Q.57	Plant	2	6.04	3.24
S.J.4	Plant	2	15.09	12.15
S.J.16	Plant	4	3.80	5.88
,,	Ratoon	1	12.87	14.83
Trojan	Plant	15	9.70	9.89
,,	Ratoon	5	25.46	26.41
Vidar	Plant	3	9.26	11.40
,,	Ratoon	1	21.93	22.60

Forecast of Approved Varieties for 1957

In accordance with usual practice, the Bureau has prepared a forecast of the changes it is proposed to make in the approved variety list of 1956. Any interested farmers' organizations which consider alterations should not be made along the lines indicated, or wish to submit any other changes, are invited to submit their views to the Director of Sugar Experiment Stations before 30th November, 1956. **Any objections against varietal deletions, or suggestions for additions, must be accompanied by a detailed statement of the reasons for such objections or suggestions. No action can be taken in respect of late or unsubstantiated requests.**

Hambledon—Add Q.59.
Mulgrave—Add Q.64.
Babinda—Add Vidar.
Mourilyan—Add Q.57 and Q.59.
South Johnstone—Add Q.57 and Q.59.
Tully—Add Q.57, Q.59 and Q.64.
Invicta (Inkerman area)—Add Q.50.
Kalamia—Delete P.O.J.2878.
Inkerman—Add Q.50. Delete P.O.J. 2878.
Cattle Creek—Add Q.56.
Racecourse—Add Q.56.
Farleigh—Add Q.56.
North Eton—Add Q.56.
Marian—Add Q.56.
Pleystowe—Add Q.56.
Qunaba—Add Q.61.
Millaquin—Add Q.61.
Fairymead—Add Q.61.
Bingera—Add Q.61.
Gin Gin—Add Q.61. Delete Q.25.
Isis—Add Q.61.
Maryborough — Add Pindar and Vesta.
Moreton—Add Q.61.

Field Day Address

LOWER BURDEKIN SUGAR EXPERIMENT STATION

By NORMAN J. KING

It is probable, that at no time since the war years, have industry costs been receiving so much consideration as they are today. Recently announced freight rises on sugar cane, sugar and fertilizer, gradually mounting costs of harvesting and the trend towards lower c.c.s. in the State tends to obscure the real position. I have examined figures for the four mill areas in the Lower Burdekin and these show that, compared with the five years prior to the war, the figures for the past five years are over a unit lower in c.c.s. With

Fig. 35—Part of the tractor and machinery exhibit at the Lower Burdekin Field Day, July, 1956.

cane are only some of the factors contributing to the economic position of those whose livelihood is in the sugar industry. My talk to you today is related to two of these items—the c.c.s. of cane and some aspects of harvesting costs.

You, as growers in this area, are aware of the fact that c.c.s. content of cane has shown a downward trend all over the State during the past fifteen years. This has been most marked in certain far-northern areas, but the Lower Burdekin has not escaped. The fact that this district still produces cane with the highest sugar content in c.c.s. units being worth upwards of eight shillings this loss cannot be observed with any complacency.

You will naturally enquire as to the principal factors contributing to this downward trend in sugar content of your crops. I feel that they can be detailed under three headings—the change in cane varieties, the more liberal use of sulphate of ammonia and the deterioration in harvesting procedures. There is little doubt, and I feel that few of you will disagree with me, that in the pre-war years when higher c.c.s. returns were obtained, your cane was delivered at the mill in

a fresher and cleaner condition than is now the case. It is not my intention to enter into any discussion on this matter; I merely mention it as one factor which affects your c.c.s. returns. Any extraneous matter with your cane will reduce c.c.s. and any considerable delays after burning will have a like effect.

During the period of years I am discussing your yields of cane per acre have increased and this has been due, in part, to better fertilizing and the use of increased quantities of sulphate of ammonia. It is doubtful if this has had any marked result on sugar content, but there is a tendency to chase tonnage of cane by heavy fertilizing and some of the crops are undoubtedly producing lower c.c.s. from too heavy or too late applications of sulphate of ammonia.

But the biggest factor in cane quality deterioration has been a varietal one. In the pre-war years when these local mill areas averaged between 15 and 16 c.c.s. the major varieties grown were Badila, Clark's Seedling, B.208, E.K.28 and S.J.2. You will notice the prevalence of high-sugar, early maturing canes, and the predominance of Badila which gave a high level of sugar content throughout the season. Today the picture has changed to such an extent that Trojan, Pindar and S.J.16 dominate the crop; of these, two are late maturing varieties and the other, Pindar, has a peak of maturity which does not last sufficiently long.

We, in the Bureau, have pointed out previously the reason why modern hybrid canes are less likely to give high sugar contents than the older noble varieties. It will probably do no harm to repeat that explanation. The hybrid cane contains in its breeding a proportion of wild blood which confers vigour, and some resistance to disease and harsh conditions. But the wild canes have no maturity period; they continue to grow throughout the year. It follows therefore that, unlike the noble canes, the hybrids will grow more vigorously and, instead of slowing down and maturing in the winter months, will

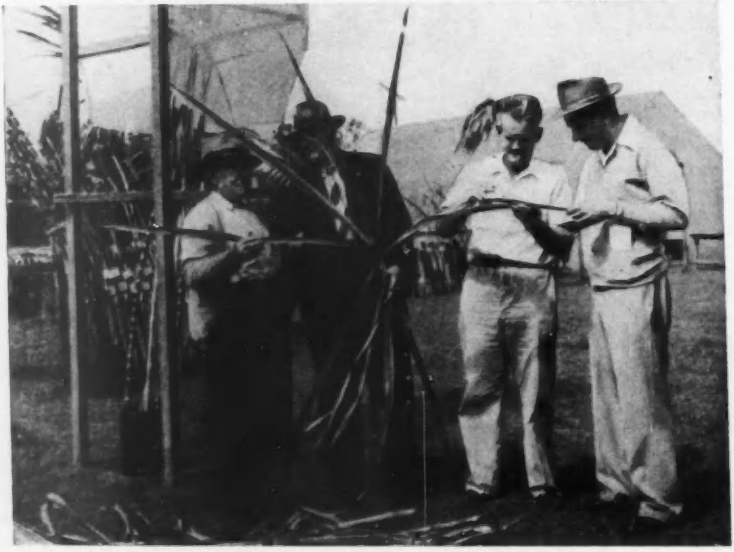

Fig. 36—Canegrowers examining the symptoms of chlorotic streak disease at the Lower Burdekin Field Day.

maintain growth and make less sugar.

The trend is towards higher and still higher tonnages of cane and sugar per acre and no grower can be blamed for striving to build up his production. But by doing so with modern cane varieties he must suffer the loss of the high c.c.s. previously gained with noble cane. It is for you to choose.

In my introductory remarks I mentioned the matter of harvesting costs, but I am considering these purely from the varietal angle. During the same period of years when your c.c.s. values have been dropping because of growing more vigorous hybrid canes there has been a trend towards a greater proportion of recumbent and lodged cane, resulting in higher harvesting costs. The two are closely inter-related. The ideal position for the future would be to have a set of cane varieties of high average yield and c.c.s., and which would remain erect under normal or abnormal conditions. Perhaps this is too much to expect, but our cane breeding efforts have gone some distance in attaining this objective—at least in part.

Lodged cane affects you in two ways. It attracts a much higher cutting rate and the cane is normally of lower c.c.s. than the erect cane alongside. We have recognised this disability for a long time and we have aimed at producing some varieties which possess the character of erectness and which could be called anti-lodging canes. As an example of these I would draw your attention to Q.57 which has gained some popularity in this area. During the March cyclone this year Pindar was decapitated where winds were severe in the more northern areas; Badila and Trojan were blown flat; but Q.57, even in the worst of the cyclone, remained erect and demonstrated a striking resistance to wind. That is only one example. We have recently bred for rich pockets of land, where the normal varieties lodge every year, a cane called I.233, which has a remarkable capacity to stand upright even when flood conditions and high winds occur. This variety is not so vigorous as your commercial canes but it will produce 40 and 45 tons of cane per acre on rich land. It is now apparent to us that lodging is a genetical factor in cane varieties and that it is possible to breed and select for this character. Doubtless you will hear a lot more about it in the future.

Last year, before the Sugar Technologists' Society, I analysed this problem of varieties and harvesting costs and showed that a farmer's net return could be improved by growing canes of lesser vigour, but which would remain erect, be cut at award rates, and would not suffer the loss of sugar generally resulting from lodging. This is an angle well worthy of your study. I.233 is a variety which will produce less cane than Trojan, but it will not lodge, and it will return good c.c.s, figures. On the other hand, Q.57 will produce as well as most other varieties and it has the added advantage of remaining erect. One of our local seedling productions, L.469, which is displayed on the varietal stand, is another of the lodging resistant type. It is not quite so vigorous as Trojan, Pindar or Q.57, but it is suited to very rich land where it will give a good c.c.s. and remain upright.

The time is overdue for a farm study of variety economics. The highest yielding cane is not necessarily the best one for net returns, and there is little point in growing varieties which give high yields if most of the profit is to be lost because they lodge, attract high harvesting rates and give lower c.c.s. Growers on rich land would be well advised to experiment with some of the newer lodging resistant canes and to analyse thoroughly the harvesting costs and c.c.s. returns on these and the more vigorous types.

Root-Knot Nematodes in the Bundaberg Area*

By N. McD. SMITH

The occurrence of root-knot nematodes in Queensland cane fields has been known for some considerable time, but their importance previously was completely overshadowed by the more spectacular white grub and wireworm pests, and it is only since these two pests were brought under effective control that nematodes as pests of sugar cane have been accorded more than passing attention. It is therefore of interest to report recent cases where crop yields have been depressed as a result of severe infestations of these organisms.

The parasitic, crop-damaging nematodes (or nemas) are minute, worm-like animals with transparent non-segmented bodies. This characteristic serves to distinguish them from the earth worms; moreover, nematodes do not change their length appreciably in moving as do worms and other thread-like animals.

Several types of parasitic nematodes have been found living on or in roots of sugar cane but most attention has been focused on the root-knot nematodes† due to their association with root-galls or club-shaped swellings on the ends of the roots. However, there are some nematodes‡ (root lesion and burrowing nematodes) whose activity is recognised by the production of small areas of dead tissue in the otherwise normal root. The extension of such areas eventually leads to the partial or complete breakdown of the root system. Other nematodes§ (sting nematodes and spiral nematodes) feed on the root surface and never enter the internal tissues. The only evidence of their presence may be stunting of the roots.

When root-knot nematode galls are opened, the female nematodes are visible to the naked eye as small white pear-shaped bodies embedded in the plant tissue. Each female when mature secretes a globule of jelly-like material into which several hundred eggs are laid. In the spring, summer and autumn months the eggs hatch within one to two weeks, producing active larvae which enter the root tips of the plants in the vicinity. The developing nematodes lose their motility and undergo a series of moults becoming pear-shaped females or worm-shaped males, approximately 1/25 inch in length. Nematode infestations are most severe during hot dry weather, particularly on sandy soils. During the winter months the activity of the pests is at a minimum and roots produced during this time are frequently not attacked.

Cases of damage to cane crops by root-knot nematodes, which were referred to earlier, occurred recently in the Bundaberg district. In one instance in the Calavos area a field of second ratoon Pindar showed a few scattered yellowish patches where growth was poor. Inspections revealed the presence of root-knot nematodes and in the absence of any other contributing factors they were considered responsible for the depression in vigour.

Two other cases investigated were at Mullett Creek. The varieties affected were Pindar spring plant cane and C.P.29/116 autumn plant cane. Nematode damage was very severe and losses were conservatively estimated at 10 tons per acre. In each instance the soil type was similar, being a light-textured greyish, sandy loam.

Of particular interest during the investigations was the degree of resistance shown by different varieties. At Mullett Creek, Co.290 was planted as supplies in the poor patches and showed vigour comparable to the unaffected

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* Reprinted from the Proceedings of the Conference of Cane Pest and Disease Control Boards.
† *Meloidogyne* spp.
‡ *Pratylenchus* spp. and *Radopholus similis*.
§ *Trichodorus* sp. and *Rotylenchus* spp.

parts of the field, whereas adjacent C.P.29/116 was much inferior. Diggings showed greater development of the root systems in the Co.290 and fewer galls.

Measures of control against the pest are limited, for direct means such as pre-planting fumigation are costly. Applications of molasses, filter muds and other soil amendments are reported to be beneficial, for in addition to increasing soil fertility, there is a build up in the soil of certain organisms which prevent the development of excessive numbers of nematodes and so help to reduce the damage caused by the pest.

With other economic crops, a long rotation incorporating resistant or immune plants may be practised to reduce the numbers of nematodes. This is not always possible under cane-growing conditions, although a two-year period with a perennial rattle-pod legume (*Crotalaria*) would help considerably in reducing potential damage. In this system it is important to keep the field free from weeds as oftentimes they provide hosts for the nematode. An annual rattle-pod could be utilized as a measure of control, but should be followed with another resistant crop such as sudan grass, peanuts or sorghum.

The importance of selecting resistant or immune rotation crops was strikingly demonstrated at Alloway in a legume plot. Mung bean (Nardello bean) on trial against Reeves' Selection Cowpea, showed susceptibility to nematodes with subsequent heavy galling on the root system and depression in growth.

"Unusual Wind Storms"

During the past year the Clayton-Elliott section of the Bundaberg district has experienced two intense wind-storms. Fortunately, these have been confined to a relatively restricted area, and overall damage to cane crops has not been high.

The first storm which occurred during the latter half of 1955, cut a swath about two miles long and 200 yards wide through farm lands and standing timber, damaging houses, stripping standing timber and causing severe lodging of standing cane.

Fortunately, the second storm, which occurred during early February, 1956, struck standing timber first and apparently lost some of its strength before crossing adjacent cane fields. The illustration indicates the type of damage caused by these occurrences. The tree in the centre foreground, in common with others which can also be seen, has been completely defoliated, smaller branches stripped off and a top snapped off. Undergrowth and smaller trees have been broken and flattened and these, with the tops and branches of the large trees, form a mass which covers the ground. The devastated area is about 15 chains long by four chains wide, undamaged trees can be clearly seen in the background.

Wind-driven branches, large and small, caused moderate damage to adjacent young plant cane.—H.G.K.

Fig. 37—Result of a severe wind storm in the Bundaberg district.

Mackay Field Day Address

By NORMAN J. KING

It is an oft' repeated statement that one should not live in the past, but rather look forward into the future. One might perhaps be excused, however, for casting a quick eye backwards to take stock of what has been achieved, and then to see what plans can be made for further improvements in the future.

The Mackay sugar district has some reason to be proud of its position in the industry, inasmuch as it produces about a quarter of the total cane and sugar output of the State. But it has not always occupied that position and most of its advancement to the present state of affairs has taken place in the short period of the past fifteen years.

It may surprise many of you to hear that the Mackay district did not reach a productive rate of 20 tons of cane per acre until 1948 season, but from 1948 to 1955 it exceeded that figure on five occasions. When addressing you last year I stated that over the past six years the seven local mill areas had shown a 20 per cent. increase in production over the pre-war period. What has happened during the past decade or so to improve production so markedly?

I think we might point with accuracy to three outstanding developments. Firstly, the two insect pests of this district, the cane grub and the wireworm, have been controlled by the use of BHC and you no longer experience serious germination failures from wireworm attack or crop losses from grubs.

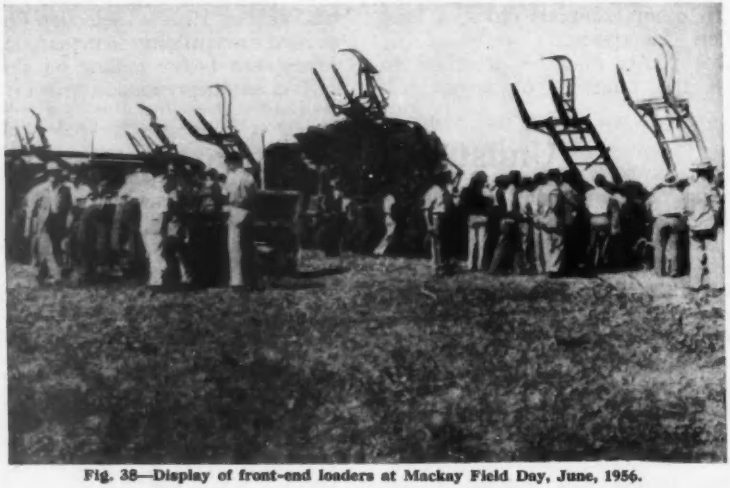

Fig. 38—Display of front-end loaders at Mackay Field Day, June, 1956.

This discovery was of very great benefit to the growers of this area. Secondly, the breeding of Q.28 and its distribution throughout the district opened a new production door to you. No longer was your production kept down to the limits of Q.813, M.1900, Clark's Seedling and such canes. Perhaps some of you who suffered from the depredations of ratoon stunting disease in Q.28 might consider that its breeding and distribution was a mixed blessing. But you should not overlook this point, and it is an important one, that, had it not been for Q.28, ratoon stunting disease may never have been discovered. It was only because that variety was so

severely stunted by the disease that the matter was made the subject of a full-scale and high priority investigation. As you know, the disease was found to be present in every other district and variety and, in fact, in every other cane growing country; so, the Q.28 trouble as we used to call it was the starting point in discovering the disease, initiating control measures, and reducing the losses which were occurring in other varieties.

The third factor in Mackay's recent development was, of course, the breeding of Q.50, which is now the major cane variety of the State. It would be superfluous for me to speak of what Q.50 means and has meant to this district—and, I hope, will continue to mean. These are the three things which have contributed most to your local production and when you come along to a Field Day here I would like you to remember that all three—the two cane varieties and the grub and wireworm control—were developed on this small property.

In regard to Q.50, a member of your executive has recently suggested to me that a suitable tablet might be erected on our building here to record the contribution which that cane has made to your economy. I could think of no more fitting recognition. In south-western Queensland some years ago a memorial hall was erected to an insect—the cactoblastis—which controlled the prickly pear and made possible the settlement of that part of the State. It would be unique in Queensland to have something commemorative of a cane variety, and it is doubtful if any variety except Badila has done more for our industry than has Q.50.

And now, what is in the future? The economy of this district will not continue indefinitely to rely on the achievements of the past, but, having set a higher standard of production by pest and disease control and by the use of better varieties, it becomes more difficult to surpass such a standard. I think we can say with some truth that the rise in production in the next ten years will not be so spectacular as in the last ten. That does not mean that we propose to remain content with Q.50 as the best possible cane for this area, or that we are satisfied with the present standard of production. Every year the cane breeding work is being intensified and we already have canes which, under certain conditions, are superior to Q.50. Q.58 has already

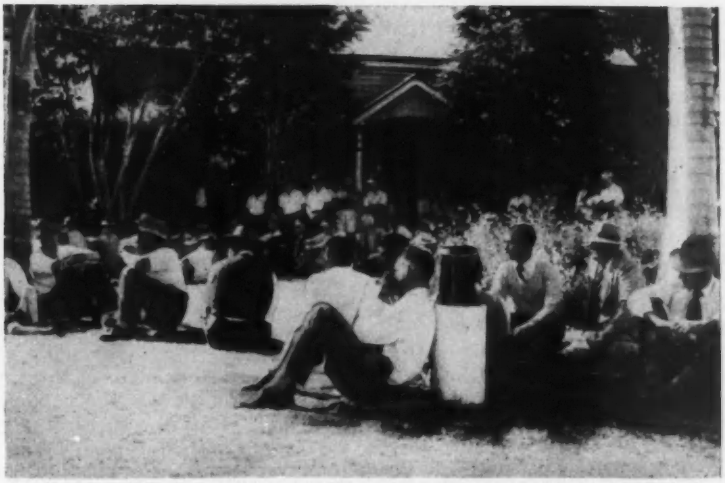

Fig. 39—Some of the growers listening to addresses on the occasion of the Mackay Field Day.

been added to your approved variety lists; Q.56 and N.Co.310 are to be distributed to interested growers this year and Q.63 will probably be distributed in the following year. These canes have demonstrated considerable promise in comparative plantings with Q.50 and they should assist in improving the production of the district. So much for the variety position, which is very satisfactory.

The ratoon stunting disease control work is well advanced and within a short few years this disease, which has been taking toll of your production, should be under very good control. It is not meant by this statement that it will have been eradicated, but it is anticipated with some confidence that it will exist only as a scattered infection in fields of susceptible varieties, and that normal field sanitation will prevent it becoming a threat to production.

In all areas there are problem soils which do not respond to normal farm practices and which do not react as they should to correct fertilizing. It is our aim to devise means to improve the production capacity of such soils and, with that end in view, we will transfer to this Station at the end of this year our Senior Soils Chemist. Provision is made in the new building here for a well equipped soils laboratory and your soil problems in the future will be investigated on the spot by an experienced man.

In erecting this new building on the Mackay Station we are carrying out a plan of decentralisation of our technical staff. Some of you are aware that the old building here was the original home of the Bureau when it was established by Act of Parliament in 1900; this building was then at the site of our old Station at the Lagoons. Today we are replacing it with a Station building which will house our Station manager and field advisory staff, the soils chemist I have just mentioned, and it is proposed to build up a staff of agronomists to cater for all cultural problems. There is also provision for mill technology staff, if required in this area in the future.

These moves have as their target the further improvement of production in this district and we look forward with confidence to a raising of the standards during the forthcoming years. Let me repeat that Q.50 should not be looked upon as the last word in cane varieties even though most of you may be satisfied to retain it as your major cane. Any new varieties released from this Station have been thoroughly tested and you are recommended to try them on your properties. Many of you, I feel sure, will grow them as complementary varieties to Q.50 and thus improve your farm production figures.

Progress

Hawaiian Sugar News records that Lihue Plantation Co. Ltd. will be the last of the Hawaiian sugar plantations to change from railroad transportation of cane to motor-trucking. It is estimated that the entire cost of conversion will approximate to $3,200,000 (£A1,420,000). This expenditure will include road material, the building of primary, secondary and field roads, exit and entrance facilities from and to the mill, hauling equipment and infield transport units, mill changes and a truck maintenance shop.

Hawaii has gradually changed, throughout the entire industry, from rail and flume transport to road haulage despite the high cost of plantation road construction for the very heavy haulage units.

In Hawaii the railways referred to were owned by the plantations, but were obviously found to be uneconomic. Is this a portent of things to come in those parts of Queensland where cane is hauled by railways? If so it presupposes a tremendous expenditure on good main and feeder roads.

Leaf-Scald Disease and Q.57

By C. G. HUGHES

The sugar-cane disease known as leaf scald is caused by a bacterium and, at the present time, this disease is the most important bacterial disease in the commercial cane fields of the State. Gumming disease used to be the most important but it is some six or more years since it was last seen and it is surmised that the organism causing it has been eliminated from sugar cane in Queensland. Another bacterial disease known as top rot or red stripe—the two symptoms are manifestations of the same disease—is not common, owing generally to the high level of resistance of the current popular varieties, but not so long ago it did cause some trouble in noble varieties such as Badila when they were planted in the spring and were still backward when the wet season came in the first months of the year. The disease can still be found occasionally, but it is rare for any serious losses to occur since only a stick or two per stool is affected and the increased growth of the remaining sticks largely compensates for the dead ones.

Leaf-scald disease has occurred in most areas in Queensland and in the Northern Rivers areas of New South Wales. At the present time it occurs in the mill areas north of Townsville and odd stools may be found in the Moreton mill area in South Queensland. It has been found within recent years in fodder cane in South Queensland but, although its distribution in the non-sugar growing districts is not known, fodder canes do not appear to be acting as reservoirs of the disease in the established sugar-cane areas. Leaf-scald is usually confined to the wetter areas but does need a check in the growth of the crop in order to produce its typical symptoms. A

Fig. 40—This stunted, leaf-scald diseased stool of Badila is overshadowed by its healthy neighbours.

diseased crop may appear outwardly perfectly healthy as long as growing conditions are good, but a sudden dry spell will cause the symptoms to show in many stools. The masking of the symptoms is one of the difficulties to be faced in framing and carrying out control measures against the disease, and is the chief reason why it continues to be a problem, not only in Queensland, but in several other cane-growing countries.

vascular bundles show a bright red colour through the nodal area.

Losses can be considerable in susceptible varieties in some years (see Fig. 40 and 41) and as a general routine all varieties are tested for resistance before they are placed on the approved lists for the northern mill areas. The testing of sugar-cane varieties for resistance to leaf-scald is not straightforward in that it is difficult to interpret results obtained from

Fig. 41—Leaf scald can be a killer. Dead cane remaining in a field of H.Q.426 at Tully after the cutters had loaded the living stalks.

The symptoms are fairly characteristic and normally cannot be confused with those of other diseases although the sudden death of stools in mature cane, which is often a feature of the disease, gives no hint as to the cause, and very much resembles death due to a sudden cutting off of the water supply. The persistent, or chronic, symptoms consist of (1) yellowish leaf streaks broadening into dead tissue at the edge of the leaf blade, and showing fine, white "pencil lines" towards the base, (2) death of the stalk, and (3) copious side-shooting. The side shoots frequently show the pencil lines and, internally, the diseased veins or

inoculation of the setts with a suspension of the causal bacterium unless the plants are grown in localities where the disease occurs naturally. It is not Bureau policy to plant disease resistance trials on commercial farms where there is the slightest risk of a trial providing a focus of disease heavier than that in surrounding fields and, for some years now, all Bureau scald trials have been planted away from commercial cane fields. At the moment, the trials are conducted at the Pathology Farm, Eight Mile Plains, and the difficulty associated with sett inoculation appears to have been overcome by substituting for it the inoculation of the

freshly cut stubble surface. Results using this method have given reactions with standard varieties such as H.Q.426, Oramboo, Pindar, Q.44 and Trojan, which parallel their known reaction in the field, although it must be borne in mind that it is possible for some varieties to react differently in the two situations.

As mentioned above, leaf-scald is a problem in North Queensland, although during the last few years the disease has been more difficult to find than previously owing to what appears to be an unduly high degree of masking. The true situation may not be revealed until a marked discontinuity of growth brings about conditions favourable for the development of symptoms. In the meantime, with a virtual absence of symptoms in the field in reasonably susceptible varieties such as Trojan, trial results must be relied upon in evaluating the resistance of the new seedlings. The variety Q.57 is a current example. There is no information concerning its reaction in the field but trial results indicate that it will behave very much as Trojan does, *i.e.*, that it will not suffer unduly unless diseased setts are used or unless there is knife infection from a number of diseased stools. In one trial, Q.57 behaved exactly as Trojan did in that inoculation of the young stubble gave approximately 80 per cent. infection, but within two months of cutting practically all symptoms had disappeared, although there were some deaths in the mature crop due to the acute phase of the disease. In a second trial Q.57 showed considerably less disease than Trojan.

Q.57 shows considerable promise for the areas north of Townsville after becoming well established as a high yielding commercial cane in the irrigated area of the Lower Burdekin some 50 miles to the south of Townsville. It will be planted in the North in the very areas where leaf-scald infection is likely and farmers should be certain that they consult their local Bureau or Cane Pest and Disease Control Board officers should there be any doubt as to the health of the plant source. It is just foolishness to run the risk of planting diseased setts, when a little trouble will guarantee that the new crop will start life in a healthy condition.

The Cane Variety Position in Queensland

Analysis of the 1955 crop shows that five cane varieties dominated the varietal scene; between them they constituted 87.6 per cent. of the State's crop. Q.50, for the third year in succession, was the most extensively grown cane with Pindar, Trojan, C.P. 29/116 and Badila in the next four places.

In the next few years we can expect some changes in the varietal picture. It is difficult at this juncture to see any of the above canes being displaced from the "big five", but the relative importance of some of the other varieties will alter. Q.57 is now enjoying considerable popularity in the Lower Burdekin and the far north, N.Co.310 is being planted extensively in the southern division, Q.56 and Q.58 will replace a lot of Q.50 in Mackay, and Q.61 should attract much attention in the southern areas. Others which will be planted on big acreages in the north are Q.59 and Q.64. The varietal picture is an ever-changing scene, and is indicative of the keen interest on the part of growers to improve returns on their fixed acreages. It is a healthy sign and augurs well for the future of our industry.

Random Gleanings

The annual Field Day at Mackay Experiment Station this year was the occasion for a remarkable display of front-end loaders. The interest evinced by the 500 growers who were present was an indication of the appeal that this type of machine has in the Mackay district. Our discussions with manufacturers in recent times led us to expect some marked improvements in loaders in the not too distant future. Gradually the weaknesses are being corrected and the difficulties ironed out. Local inventiveness and ingenuity will solve the loading problems in the same way as it has overcome most farm machinery obstacles.

On the same subject of mechanical loading, the Director, on a recent visit to Harwood on the Clarence River, was struck by the interest displayed in this form of mechanization at that centre. A considerable number of front-end loaders are operating in the field there this season. They were used to some extent last year also, and their popularity is due, in some degree, to the fact that cutters actually increased their weekly earnings while, at the same time, escaping the heavy loading work.

It was interesting to find also, at Harwood, that the mill has been using radio telephones for some four years to assist in controlling its cane supply. Most Queensland growers are aware that the bulk of Harwood's cane supply is conveyed to the mill by punts which are drawn by large launches. The launch driver is very dependent on tides in the river and, of course, has little opportunity of maintaining contact with the mill and advising it of pending deliveries, punt troubles, or other matters. The radio telephone allows continuous and efficient contact between the weighbridge and all launches.

Chlorotic streak disease has been found on a farm in the Giru area. Gradually this insiduous disease is showing up in most mill areas in the State. It has been present for a long time in all areas north of Townsville, as well as in the Moreton and Proserpine districts. In recent years its presence in Mackay was detected, and a small outbreak was located at Childers. A single stool was found in Bundaberg last year and now a diseased farm has been found at Giru. The only clean areas in the industry are the Ayr and Home Hill districts.

The transfer of one of the Bureau pathologists to Meringa was forecast in these columns some time ago. He has now taken up duty at Meringa and will, among other things, keep a watchful eye on the control of ratoon stunting disease in the northern division. His presence at our northern experiment station will provide a speedy service to growers and disease Board supervisors who require advice on cane diseases and allied problems.

The continued spread of the giant sensitive plant in North Queensland gives cause for considerable concern. It was recently found on a cane farm at Freshwater, near Cairns, and it has also been located on a property in the Mossman area. In the latter instance, seed of the plant had been introduced with some guinea grass seed which had been collected in another area. It is disconcerting to hear that certain sand and gravel deposits in the Innisfail area are infested with seed of the giant sensitive plant, and these deposits are regularly used for concrete and other work in the district. If this means of spreading the pest is to continue, the attempts at control already being made will be even less effective.

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture for Green Manure Seed

The Bureau laboratories in Brisbane will post to any cane grower sufficient fresh culture to inoculate seed of cowpeas, velvet beans, mung beans or other types being grown. Instructions for use of the culture will be enclosed. Address your request to The Director, Bureau of Sugar Experiment Stations, Brisbane, *but allow at least a week, after receipt of your letter, for the culture to be prepared and posted.*

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.